# GENERAL NOTES.

The *Astrophysical Journal* for January, 1905, contains an interesting article, by Professor BARNARD, on the Bruce photographic telescope of the Yerkes Observatory. This instrument has been in the course of construction for a number of years, and was finally completed and put into position during April, 1904. It is a doublet, both lenses being of the "portrait-lens" type. The larger of the two lenses has an aperture of ten inches and a focal length of fifty inches, the smaller an aperture of six and a quarter inches and a focal length of thirty-one inches. As will be seen from the shortness of the focus of these lenses, they are well adapted to photographing such objects as comets, portions of the Milky Way, and parts of the sky containing faint nebulous masses. Two excellent reproductions of the Milky Way in *Cepheus* are given to illustrate the work of these lenses. The larger lens was figured by BRASHEAR, and the mounting for the lenses was made by WARNER & SWASEY. The mounting contains a number of novel features, chief of which is the bending of the iron pier through such an angle as to make the upper part of it serve as the polar axis of the instrument. By this device it is possible to carry the telescope past the meridian without bumping into the pier, and this is very useful when photographing an object which crosses the meridian near the middle of a long exposure. The pier is constructed of two parts, so that the inclination of the upper part may be changed to any desired angle by the insertion of a wedge of the proper size. The clockwork is provided with a device by which its motion may be reversed so the instrument may be used in the southern hemisphere if desired. The instrument has been dismounted and transported to Southern California, where it is to be used for some time to photograph portions of the Milky Way which cannot be reached at the more northern latitude of the Yerkes Observatory. We may feel sure that some excellent astronomical pictures will be secured while the instrument is in the hands of such an experienced astronomer and photographer as Professor BARNARD. S. D. T.

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On the evening of December 15, 1904, a lunar fog-bow was seen at this observatory. The moon at the time was about five

degrees above the crest of the mountains to the west, and some twenty degrees above the horizon. The valley was filling with fog, and the bow was seen distinctly against the fog covering the eastern mountains. The bow was complete, but the separate colors were not distinguishable. The phenomenon remained visible for several minutes, and on the following evening another, but fainter, bow was seen under almost exactly similar conditions. S. D. T.

INTERNATIONAL LATITUDE OBSERVATORY, UKIAH, CAL.

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The annual report of the meteorological observations made at the International Latitude Observatory of Mizusawa (Japan) has been issued recently. In many respects the weather of Japan is almost the exact antithesis of that of California, and it is of interest to compare the weather at the two stations, Mizusawa and Ukiah, for 1903. I am indebted to Dr. GEORGE MCCOWAN, volunteer observer of the U. S. Weather Bureau, for the meteorological data of Ukiah. In the U. S. Weather Bureau service "clear days" are defined as those in which the average cloudiness is less than three on a scale of ten, and "cloudy days" those on which the average is greater than seven. No statement is made in the report concerning the Japanese practice in this regard. During 1903 there were sixteen days upon which a sprinkle of rain fell at Ukiah, and these are classed with the days upon which no rain fell.

| | MIZUSAWA. | UKIAH. |
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| Precipitation (1903) | 63.10 inches. | 32.40 inches. |
| Maximum | 8.83 (Aug.) | 11.93 (Nov.) |
| Minimum | 1.46 (Feb.) | 0.00 (May, June, July, Aug., Sept.) |
| Number of days on which rain fell | 238 | 60 |
| Number of days on which no rain fell | 127 | 305 |
| Maximum interval with rain every day | Ju'y 16 – Aug. 4 (20 days.) | Jan. 19 – Jan. 28 (10 days.) |
| Maximum interval without rain | Apr. 3 – Apr. 10 (8 days.) | Apr. 17 – Oct. 3 (170 days.) |
| Number of clear days | 17 | 227 |
| Number of cloudy days | 189 | 67 |
| Maximum temperature | 93° F. (Sept.) | 111° F. (Aug.) |
| Minimum temperature | 5° (Dec.) | 19° (Feb.) |

The report contains also, as an appendix, a list of the earthquakes experienced at Mizusawa in 1902 and 1903. In the former year there were 155 and in the latter 114, besides a considerable number of pulsatory oscillations. S. D. T.

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The *Astrophysical Journal* for December, 1904, contains some very interesting articles, most of which were read before the Congress of Arts and Sciences which met in St. Louis in September. Our readers who are interested in spectroscopic work should not fail to obtain a copy of this number of the *Journal.* A list of the articles referred to is given below: "Co-operation in Solar Research," GEORGE E. HALE; "Remarks on Standard Wave-Lengths," HENRY CREW; "Rapport sur la Nécessité d'établir un Nouveau Système de Longueurs d'Ondes Etalons," A. PÉROT et CH. FABRY; "New Standards of Wave-Length," H. KAYSER; "Some Total Solar Eclipse Problems," C. D. PERRINE; "On a New Method for the Measurement of Stellar Spectra," J. HARTMANN; "A Desideratum in Spectrology," EDWIN B. FROST.

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Last night a most wonderful fireball was seen at this station. While walking around outside the observatory "between stars" of the latitude observing programme, a fireball of the shape of the crescent Moon appeared suddenly in the southeast, moved slowly to the north in a horizontal plane about on the almucantar of the Pole Star. As the object moved it developed rapidly, passing through phases like the Moon until the full-moon stage was reached. After remaining at this maximum size a moment, this remarkable object then passed rapidly through the phases of the waning Moon, and finally disappeared about ten degrees east of the Pole Star. When full the fireball was somewhat larger than the full Moon,—perhaps about 37′ in diameter,—but not quite so bright as the Moon. When in the crescent form, just before disappearance, the whole disk was seen faintly appearing like the new Moon when lit up by the earth-shine. Immediately after the disappearance of this remarkable fireball I went into the observatory to record the time, which was found to be $1^h\ 40^m$, and then I

awoke with a dull, sickening thud and found that it was quarter past seven and time to get up and light the fire. S. D. T.

UKIAH, CAL., December 7, 1904.

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The International Jury at St. Louis awarded a gold medal to Professor BROOKS, of Hobart College, for the discovery of comets. Dr. BROOKS now has twenty-four to his credit.

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The Lalande gold medal of the French Academy of Sciences has been awarded to Professor S. W. BURNHAM, of the Yerkes Observatory, for his researches in astronomy.

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MISS DOBBIN'S DETERMINATION OF THE ORBIT OF THE FIFTH SATELLITE OF *JUPITER*.

I am quite unable to understand Mr. TOWNLEY'S criticism of Miss DOBBIN'S work on the fifth satellite of *Jupiter* in *Publications* A. S. P., No. 98 (page 223).

It was at my suggestion entirely that she based her work upon my observations alone—not that those observations were supposed to be better than any others, but for one reason in particular, and that the one Mr. TOWNLEY objects to,—viz., that they were all made by one observer, which would prevent any confusion that might come from the personality of different observers by which the very quantities sought might be masked. And further, the only measures that have been made of this satellite are those at the Lick, at the Pulkowa, and at the Yerkes observatories. No measures have been published from Pulkowa in ten years that I know of, and I am under the impression that no measures have been made there in that time. Professor AITKEN'S valuable measures are referred to the other satellites, and would require an investigation of their orbits before they are available. Furthermore, as these observations were made by an entirely different method, they should be treated differently, and when this has been done they will give an independent determination of the orbit which will have peculiar values of its own. As Miss DOBBIN was forced from want of time to confine herself to recent years, she had no choice in the matter for the very want of other material.

Mr. TOWNLEY cites the admirable work of Mr. HINKS in the determination of the solar parallax from photographic

observations made at different observatories in America and Europe as an example of using the work of different observatories. This illustration does not seem to be a just one, for the two cases are quite different, and for the reason also that the parallax depended on different observers placed at different points on the Earth's surface, and was in strict adherence to a definite programme previously arranged for; though it is true that one observer could have determined the parallax from morning and evening observations, as was done by Sir DAVID GILL in 1877 with *Mars*. The uncertainty of getting complete sets of observations for the evening and morning observations from one point made the plan followed by Mr. HINKS the better one. It will be noticed, however, that Mr. HINKS shows that even in this case the other method would have been justified by the remarkable agreement of GILL'S individual heliometer results from minor planets with the more elaborate results from *Eros*. The probable errors of the two were almost identical.

As an example of using the work of one observer in the determination of an orbit, I would refer to the *Astronomical Journal* (Nos. 236, 237), where, determining the orbits of the companions to Comet V 1889, Dr. CHANDLER finally made a complete investigation of their orbits by using alone my observations of these bodies made with the 36-inch of the Lick Observatory, and this after having used all the observations that had been made of these companions at the Lick and elsewhere.

In the same journal (*A. J.*, 441) Professor ASAPH HALL made an investigation of the orbit of the satellite of *Neptune*, using only my observations made with the 40-inch here. At the same time there were plenty of other observations to be had. In closing his paper, Professor HALL says: "Each observer, however, should make a complete and careful series of measures as Professor BARNARD has done, since sporadic observations are of little use."

From the examples set by these eminent men, Miss DOBBIN was justified in her method of treating the observations of the fifth satellite of *Jupiter*, even though there had been an abundance of other measures, which there was not.

YERKES OBSERVATORY, November, 1904. E. E. BARNARD.